ATTACHMENT B

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
	)	
Special Access for Price Cap Local Exchange Carriers	)	WC Docket No. 05-25
	)	
	)	
AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services	)	RM-10593
	)	
	)	
	)	

DECLARATION OF KENNETH H. PAKER

1. I am the Vice President-Network Services and Chief Technology Officer for TDS Telecommunications Corporation ("TDS"), a wholly owned subsidiary of Telephone and Data Systems, Inc. In this role, I have responsibilities for all wireline technology for TDS and its affiliates, including TDS Metrocom, LLC ("TDS CLEC") and TDS's incumbent LEC and cable subsidiaries, and including both local exchange carrier technology and cable technology.
2. The purpose of my declaration is to discuss the design of TDS LEC's and TDS's cable networks to help place in context the network differences that affect each company's ability to offer high speed services to business customers.
3. I will discuss first the TDS CLEC fiber ring in Madison, which is a typical CLEC fiber build. The splice points in the ring were established at the time of construction and are typically spaced every 10,000 feet. In addition, access points for the fiber were

engineered at approximately every 1,200 feet where TDS CLEC laid the conduit or the plant is aerial. If the fiber was constructed using leased conduits systems (*e.g.* power company conduit or ILEC conduit systems), then the access points could be significantly further apart. Typically, the leased conduit is in the most dense, highest construction cost parts of the city.

4. An access point is a slack ring if the outside plant is aerial construction or a hand hole if outside plant is buried construction. Parts of the fiber sheath can be accessed at these points in the network but in any case that portion of the fiber facility will need to be opened to provide service, adding substantive costs to the project. However, this "access" is limited to a significantly skilled fiber splicer during a maintenance window. The typical work window for connecting fiber at one of these access points would be eight hours, typically in the overnight period.
5. TDS CLEC can only extend a lateral from its fiber ring to serve a customer from an existing access or splice point, unless it adds a new access or splice point. To add a new splice point TDS CLEC would need to take the entire fiber sheath out of service for several hours potentially disrupting many customers' service for an extended period (even if off hours).
6. TDS acquired two cable subsidiaries, TDS Broadband LLC ("TDS Cable") and Bend Cable Communications LLC ("BendBroadband"), within the past two plus years. TDS Cable provides service in Arizona, Colorado, Nevada, New Mexico, Utah, and Texas and BendBroadband provides service in Oregon. TDS's cable subsidiaries compete with incumbent local exchange carriers such as AT&T, CenturyLink, and Windstream. When TDS purchased these cable systems, the network did not pass many commercial

establishments in their cable serving territories. We expect to remedy this over a period of time, but we typically only build to commercial locations on a "success based approach" where projected revenues are likely to cover the cost of construction within a reasonable period.

7. Hybrid Fiber Coaxial ("HFC") networks used by TDS's cable subsidiaries and other cable providers are closed radio systems. They rely on coaxial connectors, amplifiers, and taps in order to send these radio signals to each customer premise. These systems require continuous fine tuning to remain in peak working condition. It is not uncommon for interference to be routinely injected into HFC systems, requiring analysis and debugging to correct. Therefore, cable companies typically do systematic diagnostic reviews of their entire coaxial network twice a year. It is not uncommon, in other words, for the HFC plant to perform entirely differently from day to day (or even during a specific time of day). This constant fine tuning of the coaxial plant is not required in a fiber system. Fiber systems will perform on a relatively consistent basis unless the fiber is cut.
8. As a general rule, cable plant has relatively smaller fiber counts in the interior of the HFC networks compared with ILECs' or CLECs' fiber plant. It is not uncommon to find cable plant with 8 or 12 count fibers used, compared to a typical ILEC/CLEC build using 96 fibers. So the first investigation of an upgrade from HFC to fiber to the premise ("FTTP") is to fully understand the fiber counts in the serving territory. Although TDS cable has now deployed Metro E capability at all of its head ends, the fiber count in the interior of its HFC network is much more significant to its ability to offer commercial service profitably than whether its head end is Metro E capable. Dense wavelength division multiplexing (DWDM) is available to make much more efficient use of each fiber, but

this technology will only go so far when serving commercial densities. Therefore, if adequate HFC interior fiber count sizes are not currently available, then the process to upgrade the fiber size to higher fiber counts adds a significant amount of cost to the FTTP project.

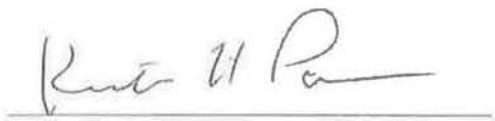
9. Where a cable provider serves several commercial customers using DOCSIS over the same plant, challenges result in two areas: (1) the ability to offer dedicated service is a challenge since DOCSIS is a shared delivery system, and (2) upstream speeds are harder to accomplish on a DOCSIS facility than with fiber.
10. Our TDS Cable and BendBroadband networks only offer upstream speeds to 25 Mbps over DOCSIS 3.0 facilities. The shared facilities, however, makes this 100 Mbps down/25 Mbps up a "best effort" service. While it is possible to dedicate all of the bandwidth in a service group to a single customer, that would require allocation of precious RF spectrum and is not economically viable. A business customer that desires committed bandwidth rates and service level guarantees is not likely to be satisfied with best efforts 100 Mpbs/25 Mbps service.
11. Subject to the caveats above concerning the drawbacks of best efforts service, DOCSIS 3.0 can be competitive against fiber to the node ("FTTN") if a customer does not require service level guarantees, but not competitive against FTTP. If the ILEC is offering fiber, we nearly always have to do the same. However, if the commercial customer wants a video product, which is fairly infrequent, then DOCSIS 3.0 becomes more competitive.
12. When DOCSIS 3.1 becomes available, the situation improves only slightly. While the DOCSIS 3.1 specification theoretically allows for a dramatic increase in upstream speeds, in practice it requires significant re-work of the outside plant. Our view is that

this approach will rarely be used since we are much more likely to build out fiber to these businesses where it is cost-justified for the competitive reasons described above.

13. DOCSIS 3.1 technology is just becoming available in the market and we do not have it integrated yet into our engineering systems or our back office provisioning systems. We expect broad availability of DOCSIS 3.1 technology to begin in late 2016 or early 2017. To enable DOCSIS 3.1, all electronics at both the head end and the customer premise must be upgraded. The HFC network will be expected to operate at a signal to noise ratio that is significantly higher than it runs today in order to enable these faster advertised speeds. This will add significant cost to the day-to-day operation of the HFC network and we are still working on establishing the economic cross-over point between upgrading to DOCSIS 3.1 versus going to FTTP. We believe that for commercial customers, the equation will be skewed towards building more fiber.
14. TDS's cable companies will build fiber primarily based on an actual or projected customer contract or, in some cases, in response to an ILEC FTTP initiative. The progression to all fiber for cable will be much slower than the progression for ILECs, and while we fully expect TDS's cable companies will still have HFC in 10 years, we will see coax over shorter and shorter distances as cable companies deploy fiber deeper into the network. For now, the economics for upgrading networks are stacked heavily in favor of DOCSIS 3.1 upgrades rather than deploying fiber, since cable networks were, at their heart, built for residential, not business customers.

REDACTED - FOR PUBLIC INSPECTION

I declare under penalty of perjury that the foregoing statements are true and correct to the best of my information and belief.



Kenneth H. Paker

Dated: February 19, 2016